

LARVAL FOOD PLANTS OF EMPEROR MOTHS AND HAWKMOTHS OF SANJAY GANDHI NATIONAL PARK, BORIVLI, MUMBAI (LEPIDOPTERA: SATURNIIDAE AND SPHINGIDAE)¹

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Ecological studies were conducted on the moths of Sanjay Gandhi National Park, with special reference to the Families Saturniidae and Sphingidae. Three species of Emperor moths and 32 species of Hawkmoths were recorded, of these the life histories of 26 species were studied (3 Saturnids, 23 Sphingids). For Family Saturniidae, 10 new larval food plants have been added to the 80 known species for 2 Emperor moths. For Family Sphingidae, 33 new larval food plants have been added to the 111 known species for 20 Hawkmoths. A brief overview of the larval food plants in terms of preferences, abundance and resource sharing are covered in this paper.

Keywords: Saturniidae, Sphingidae, Emperor moths, Hawkmoths, Saturnids, Sphingids, larval food plants, specialists, generalists, indicator species

INTRODUCTION

Ecological studies on the moths of Sanjay Gandhi National Park (SGNP), Mumbai, with special reference to Families Saturniidae and Sphingidae, were conducted from 1993 to 2001. Three species of Emperor moths and 32 species of Hawkmoths were recorded. SGNP is a unique national park, in that it is surrounded by a metropolis like Mumbai. It is constantly under heavy biotic pressure from humans. This National Park lies in the Western Ghats, a crucial area with rich biodiversity. Though most of the flora and fauna have been well documented, very little was known about the insect fauna of the Park. An ecological study of the moths was initiated, for which the Families Saturniidae (Emperor moths) and Sphingidae (Hawkmoths) were selected. Ecological data on the moths of Maharashtra region is scanty, and there are many lacunae in the information on their life histories, including larval food plants, which vary for different habitats. Thus, a food plant recorded for a particular moth species in southern India may differ from that found in western India (e.g. *Carissa carandas*). Detailed life histories of 3 Saturnids and 23 Sphingids were successfully recorded.

Emperor Moths: Family Saturniidae

Saturnids are known as Emperor moths or non-mulberry silkmoths (Arora and Gupta 1979). The largest moth in Asia is a Saturnid, the Atlas moth, with a wingspan of 29 cm. Besides their size and exuberant beauty, they are also known for their non-feeding adults and gregarious caterpillars. Others, like Tasar, Muga

and Eri moths are known for silk production and are commercially exploited by the silk industry.

Hawkmoths: Family Sphingidae

Sphingids are also known as Sphinx moths for the sphinx-like posture adopted by the caterpillars when threatened. They are best known for their long migratory flight; some have even been encountered at mid-sea (Kehimkar 1997). The stout, cigar-shaped body and long, narrow forewings of the adult are distinctive. The long proboscis makes Hawkmoths ideal pollinators for flowers which have a long tubular corolla (Barlow 1982).

STUDY AREA

The c. 103 sq. km area of SGNP is spread over the Greater Bombay (44.50 sq. km) and Thane (58.64 sq. km) districts of Maharashtra State. It is situated c. 40 km north of Mumbai city and c. 8 km from the Arabian Sea. The Park has four types of habitats ranging from mangroves to evergreen forests of the Western Ghats. Most of the trees are deciduous, and some evergreen. The forest has diverse flora ranging from tall trees to shrubs and herbs.

Apart from SGNP, the study was also carried out on the adjoining 1.5 sq. km land of the Bombay Natural History Society (BNHS) adjacent to the Goregaon end of the Park. The vegetation on the BNHS land is southern moist-mixed deciduous and the topography is mainly hilly, intersected with rocky streambeds of seasonal rain-fed streams (Patil 1993).

METHODOLOGY

To study the larval food plants, moth caterpillars found in the wild were reared on identified food plants. In the case of generalist (polyphagous) species, the preference levels were also observed. The scattered data on known larval food plants was compiled. Vegetation analysis of the larval food plants in the study area was conducted during two periods, monsoon (July) and non-monsoon (March). The main objectives were: (i) To assess the abundance of larval food plants in the study area in terms of availability for caterpillars, (ii) To grade the food plants as 'very common', 'common' and 'not common' according to their relative abundance.

HOST-PLANT RELATIONSHIPS

According to Scott (1933), the distribution of moths and the number of individuals of any species in any locality, is intimately connected with their choice of food plants, thus the disappearance of a plant may lead to the disappearance of a species feeding on it. Hence, the food plants could be considered as indicator species. According to Speight and Wain House (1989), plants that are abundant and widely distributed host more insect species than plants with restricted distribution. Hence, insect diversity can be broadly predicted from the abundance of a particular plant species. This association indicates that insects and plants have co-evolved in nature. Moreover, host plant selection is governed primarily by chemoreception, therefore, the emergence of specific insect/host plant relationships is most likely to have resulted from evolutionary changes in the insects' chemosensory systems. According to Jermy (1984), adaptation to the nutritional quality of the new host plant is a secondary process.

Some moth species are specialist (monophagous), i.e. they lay eggs on a single plant species only, while others are generalist (polyphagous), i.e. they lay eggs on more than one plant species. Saturnid species tend to be generalists. In the Oriental region, they have been recorded to feed on the following 52 plant families: Anacardiaceae, Annonaceae, Apocynaceae, Aquifoliaceae, Araliaceae, Asclepiadaceae, Barringtoniaceae, Berberidaceae, Betulaceae, Bischofiaceae, Burseraceae, Caricaceae, Combretaceae, Coriariaceae, Corylaceae, Cyperaceae, Daphniphyllaceae, Dilleniaceae, Dipterocarpaceae, Ericaceae, Euphorbiaceae, Fagaceae, Juglandaceae, Labiatae, Lauraceae, Leeaceae, Leguminosae, Lythraceae, Magnoliaceae, Malvaceae, Meliaceae, Moringaceae, Myrsinaceae, Myrtaceae, Naucleaceae, Oleaceae, Oxalidaceae, Palmae, Rhamnaceae, Rosaceae, Rubiaceae, Rutaceae, Salicaceae, Sapindaceae,

Simaroubaceae, Staphyleaceae, Symplocaceae, Theaceae, Umbelliferae, Verbenaceae, Vitidaceae and Xanthophyllaceae.

Sphingids are also generalists to some extent. Earlier workers, such as Scott (1933) recorded food plants for 124 species of Sphingids, which cover a wide range of 58 families of plants extending from Dilleniaceae to Gramineae. Family Rubiaceae is the most preferred, with about 30 species feeding on it, followed by Vitaceae and Araceae with 16 species. Further, Beeson (1941) added that altogether 60 families ranging from large trees to herbs and even grasses are larval food plants of Sphingids.

The study recorded 15 larval food plants for 3 Saturnids and 44 for 23 Sphingids. Since 4 larval food plant species were common to both, the total number recorded was 55 plant species belonging to 24 families. Of these, 37 larval food plants from 17 families were new records for 22 moth species (2 Saturnids and 20 Sphingids).

PROFILE OF LARVAL FOOD PLANTS

The diversity of larval food plants in terms of the type (tree, shrub or herb), habit (deciduous or evergreen) and seasonality (perennial or seasonal) is discussed here. It was observed that trees were the most dominant type, followed by shrubs and climbers, while herbs were poorly represented (Fig. 1). 78% of the larval food plants were perennial and 22% were seasonal. Among the perennial larval food plants, 46% were deciduous and 32% were evergreen.

For Saturnids, 15 tree species were identified as larval food plants, of which 73% were deciduous and 27% were evergreen. For Sphingids, 44 plant species were identified, of which 41% were trees, 30% shrubs, 20% climbers and 9% herbs. Among the trees, 39%

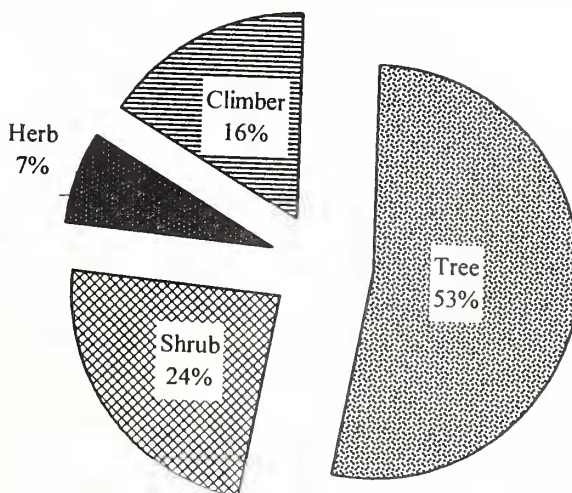


Fig. 1: Profile of larval food plants

Table 1: Larval Food plants/Plant Families and Moth Species

Plant Families	Plant Species	Moth Species	Plant Families	Plant Species	Moth Species
1. Acanthaceae	<i>Barleria prionitis</i> <i>Carvia callosa</i>	<i>Acherontia lachesis</i> <i>Acherontia lachesis</i>	15. Leeaceae	<i>Leea asiatica</i>	<i>Theretra clotho</i> <i>Theretra lycetus</i>
2. Apocynaceae	<i>Alstonia scholaris</i> <i>Carissa congesta</i>	<i>Daphnis nerii</i> <i>Nephele hespera</i> <i>Antheraea paphia</i> <i>Attacus atlas</i>	16. Lythraceae	<i>Leea macrophylla</i> <i>Lagerstroemia speciosa</i> <i>Lagerstroemia lanceolata</i>	<i>Pergesa acteus</i> <i>Theretra lycetus</i> <i>Attacus atlas</i> <i>Attacus atlas</i>
3. Anacardiaceae	<i>Holarthra antidysenterica</i> <i>Tabernaemontana coronaria</i>	<i>Daphnis nerii</i>	17. Nyctaginaceae	<i>Boerhavia diffusa</i>	<i>Hippotion boerhaviae</i>
4. Araceae	<i>Lannea coromandelica</i> <i>Amorphophallus commutatus</i>	<i>Actias selene</i> <i>Theretra clotho</i>	18. Oleaceae	<i>Nyctanthus arbor-tristis</i>	<i>Acherontia lachesis</i>
5. Balsaminaceae	<i>Anisaema murrayi</i>	<i>Theretra castanea</i>	19. Rhamnaceae	<i>Zizyphus mauritiana</i> <i>Zizyphus rugosa</i>	<i>Antheraea paphia</i> <i>Antheraea paphia</i>
6. Bignoniaceae	<i>Impatiens balsamina</i> <i>Oroxylum indicum</i>	<i>Pergesa acteus</i> <i>Theretra castanea</i>	20. Rubiaceae	<i>Catunaregam spinarum</i> <i>Gardenia florida</i> <i>Gardenia lucida</i>	<i>Cephanodes hylas</i> <i>Cephanodes hylas</i> <i>Cephanodes hylas</i>
7. Bombacaceae	<i>Spathodea campanulata</i> <i>Bombax ceiba</i>	<i>Psilogamma menephron</i> <i>Psilogamma menephron</i> <i>Antheraea paphia</i> <i>Marumba dyras</i>		<i>Haldina cordifolia</i> <i>Hymenodictyon onixense</i> <i>Mitragyna parvifolia</i>	<i>Cephanodes hylas</i> <i>Cephanodes hylas</i> <i>Attacus atlas</i>
8. Boraginaceae	<i>Cordia dichotoma</i>	<i>Polyptychus dentatus</i> <i>Acherontia lachesis</i> <i>Polyptychus dentatus</i>		<i>Morinda tinctoria</i> var. <i>tomentosa</i>	<i>Cephanodes hylas</i> <i>Neogurelca hyas</i>
9. Burseraceae	<i>Garuga pinnata</i>	<i>Antheraea paphia</i>			<i>Macroglossum belis</i>
10. Combretaceae	<i>Anogeissus latifolia</i> <i>Terminalia catappa</i> <i>Terminalia bellerica</i> <i>Terminalia crenulata</i>	<i>Antheraea paphia</i> <i>Antheraea paphia</i> <i>Antheraea paphia</i> <i>Antheraea paphia</i>			<i>Macroglossum gyans</i> <i>Macroglossum sitiene</i> <i>Macroglossum</i> <i>particolor</i>
11. Convolvulaceae	<i>Ipomoea sinensis</i> <i>Ipomoea cairica</i> <i>Ipomoea carnea</i>	<i>Agnus convolvuli</i> <i>Agnus convolvuli</i> <i>Acherontia lachesis</i>	21. Solanaceae	<i>Pavetta crassicaulis</i> <i>Pavetta siphonantha</i>	<i>Theretra alecto</i> <i>Cephanodes hylas</i> <i>Cephanodes hylas</i>
12. Dioscoreaceae	<i>Ipomoea hederacea</i> <i>Ipomoea aquatica</i>	<i>Agnus convolvuli</i> <i>Agnus convolvuli</i> <i>Acherontia lachesis</i>	22. Sterculiaceae	<i>Spermadictyon suaveolens</i> <i>Solanum violaceum</i> <i>Firmiana colorata</i>	<i>Macroglossum gyans</i> <i>Acherontia lachesis</i> <i>Marumba dyras</i> <i>Marumba indicus</i>
13. Euphorbiaceae	<i>Dioscorea hispida</i> <i>Bndelia retusa</i>	<i>Agnus convolvuli</i> <i>Theretra nessus</i> <i>Antheraea paphia</i> <i>Marumba dyras</i>	23. Tiliaceae	<i>Helicteres isora</i> <i>Grewia inequalis</i>	<i>Marumba dyras</i> <i>Marumba dyras</i>
14. Fabaceae	<i>Pueraria tuberosa</i> <i>Dalbergia lanceolaria</i> <i>Dalbergia latifolia</i> <i>Pterocarpus marsupium</i>	<i>Clanis phalaris</i> <i>Clanis phalaris</i> <i>Clanis phalaris</i> <i>Clanis phalaris</i>	24. Vitaceae	<i>Ampelocissus latifolia</i>	<i>Theretra clotho</i> <i>Theretra alecto</i> <i>Theretra</i> <i>oldenlandiae</i> <i>Theretra clotho</i> <i>Theretra clotho</i>

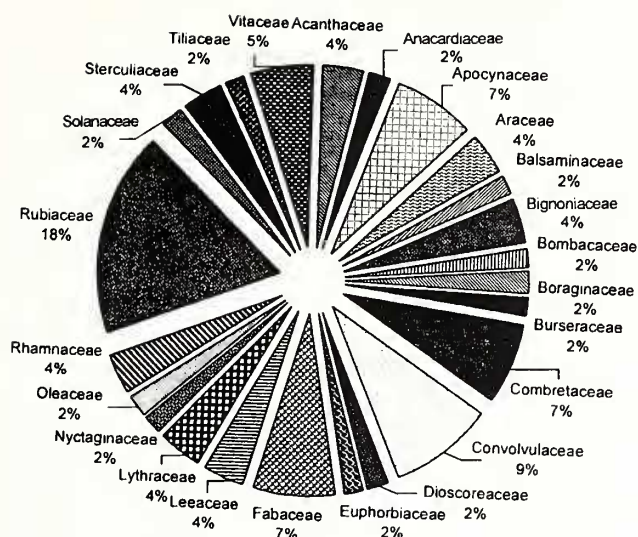


Fig. 2: Families of larval food plants

were deciduous, 34% evergreen and 27% annuals including climbers and herbs. The list of all recorded larval food plants along with their families and moth species is given in Table 1.

It can be summarised from Table 1 that of the listed 24 plant families of larval food plants:

- 11 families had only one host plant species
 - 7 families had 2 species
 - 3 families had 4 species
 - 3 families had 3, 5 and 10 species respectively.
- Family Rubiaceae was the largest, with 10 plant

species supporting 8 species of Sphingids and 1 Saturniid (see Fig. 2).

RESOURCE SHARING

Resource sharing, i.e. utilization of larval food plants by the moth species is described here. From Table 1 it can be concluded that of the 24 plant families foraged by Saturniidae and Sphingidae (subfamilies Sphinginae and Macroglossinae), 10 families were foraged by Saturniidae (3 species) while 16 plant families were foraged by subfamily Sphinginae (9 species) and 23 by Macroglossinae (14 species). Both Saturnids and Sphingids shared four plant families, Apocynaceae, Bombacaceae, Boraginaceae and Rubiaceae. The data showed that Sphingids utilized 81% of the resources, while Saturnids used only 19%. Among the subfamilies of Sphingids, Macroglossinae accounted for 48%, and Sphinginae 33%.

LARVAL FOOD PLANT PREFERENCES

Most of the Saturnid and Sphingid caterpillars were generalist feeders, but a few species behaved like specialist feeders, in that they fed only on one host plant, despite the availability of their known food plants in the area. Such species are termed as 'acting specialist' here, and there were two categories among them:

1. Moth species that preferred to lay eggs on a single larval food plant, ignoring the other known food plants found in the study area.

Table 2: List of Generalist and Specialist Species

Generalist Species	Specialist Species	Acting Specialist Species
FAMILY SATURNIIDAE		
1. <i>Attacus atlas</i>	1. <i>Actias selene</i>	None
2. <i>Antheraea paphia</i>		
FAMILY SPHINGIDAE		
SUBFAMILY SPHINGINAE		
1. <i>Agrus convolvuli</i>	None	1. <i>Marumba indicus</i>
2. <i>Acherontia lachesis</i>		
3. <i>Psilogramma menephron</i>		
4. <i>Clanis phalaris</i>		
5. <i>Polyptychus dentatus</i>		
6. <i>Marumba dyras</i>		
SUBFAMILY MACROGLOSSINAE		
1. <i>Cephanodes hylas</i>	1. <i>Macroglossum gyrans</i>	1. <i>Nephele hespera</i>
2. <i>Daphnis nerii</i>	2. <i>Macroglossum particolor</i>	2. <i>Neogurelca hyas</i>
3. <i>Macroglossum belis</i>	3. <i>Macroglossum sitiene</i>	3. <i>Hippotion boerhaviae</i>
4. <i>Theretra alecto</i>		4. <i>Theretra nessus</i>
5. <i>Theretra clotho</i>		
6. <i>Theretra lycetus</i>		
7. <i>Theretra oldenlandiae</i>		
8. <i>Theretra castanea</i>		
9. <i>Pergesa acteus</i>		

2. Moth species whose preferred larval food plant is not documented from the study area, and is observed feeding on a single allied species. *Nephele hespera* is the single example in this category.

Among Saturnids, 2 species were generalist and one was an acting specialist, while in Sphingids, 15 species were generalist, 3 were specialists and 5 were acting specialist (Table 2).

Details of individual moth species, along with their larval food plants, have been discussed here. In case of a generalist moth species, the food preferences levels were given as 'Most preferred', 'Preferred' and 'Less preferred'. The plant preference was assessed from the number of caterpillars observed feeding on it. A compiled list of known food plants, recorded plants and new larval food plants along with their moth species is given in Table 3. Some exotic plant species present on the fringes of the study area were seen to be hosts for a few moth species. Additionally, 2 larval food plants, *Arisaema uurrayi* and *Pavetta crassicaulis* mentioned in Table 3 were found outside the study area (150-350 km away) on the hills of Mahableshwar and Malshej Ghat. Such plants are marked with an asterisk.

Under each moth species, the following details of the larval food plant has been given:

KFP = Number of Known food plants,
RFP = Number of Recorded food plants,
NR = New records.

Further, under each plant family, details have been given in following format:

- Type of plant, status of plant in the study area,
- Number of caterpillars reared on the plant and
- Preference level of caterpillars (*only for generalist species*)
- Whether the larval food plant recorded during the study was a new record.

FAMILY SATURNIIDAE

As recorded by Hampson (1896), Fellowes-Manson (1920), Beeson (1941), Arora and Gupta (1979), Barlow and D'Abrera (1982), and Chaturvedi (1999), there are 80 known larval food plants for 3 Saturnids, which have been now updated to 90. Details of the larval food plants is mentioned under each species:

1. Indian Moon Moth

Actias selene Hubner 1816

KFP: 27, RFP: 01, NR: 0

Anacardiaceae

1. *Lannea coromandelica* (Houtt.) Merr.: Deciduous tree, Not Common, 05.

2. Tasar Silk Moth

Antheraea paphia Hubner 1818

KFP: 38, RFP: 10, NR: 05

Apocynaceae

1. *Carissa congesta* Wt.: Evergreen shrub, Common, 02, Less preferred, New record.

Bombacaceae

2. *Bombax ceiba* Linn: Deciduous tree, Common, 01, Less Preferred.

Burseraceae

3. *Garuga pinnata* Roxb.: Deciduous tree, Common, 03, Less Preferred.

Combretaceae

4. *Anogeissus latifolia* (DC) Wall. ex Bedd.: Deciduous tree, Not common, 01, Less preferred, New record.

5. *Terminalia catappa* Linn.: Deciduous tree, planted inside the study area, 15, Most Preferred.

6. *Terminalia bellerica* Roxb.: Deciduous tree, Not Common, 05, Preferred.

7. *Terminalia crenulata* Roth.: Deciduous tree, Not common, 03, Preferred, New record.

Euphorbiaceae

8. *Bridelia retusa* (Linn.) Spreng: Deciduous tree, Not common, 02, Less Preferred, New Record.

Rhamnaceae

9. *Zizyphus mauritiana* Lamk.: Evergreen tree, Not common, 12, Most Preferred.

10. *Zizyphus rugosa* Lamk.: Evergreen tree, Not common, 01, Less Preferred, New Record.

3. Atlas Moth *Attacus atlas* Linnaeus 1766

KFP: 19, RFP: 04, NR: 04.

Apocynaceae

1. *Holarrhena antidysenterica*: Deciduous tree, Not common, 03, Preferred, New Record.

Lythraceae

*2. *Lagerstroemia speciosa* Retz.: Deciduous tree, Not found inside the study area, 12, Most Preferred, New Record.

3. *Lagerstroemia lanceolata* Wall: Deciduous tree, Not common, 2, Less Preferred, New Record.

Rubiaceae

4. *Mitragyna parvifolia* (Roxb.) Korth: Evergreen tree, Common, 05, Less Preferred, New Record.

FAMILY SPHINGIDAE

As per Hampson (1896), Scott (1933, 1983), Beeson (1941), Barlow and D'Abrera (1982) and Smetacek (1994) there were 111 known food plants, which have now increased to 144. Details of the larval food plants have been mentioned under each species.

1. Convolvulus Hawkmoth

Agrius convolvuli Linnaeus 1758

KFP: 06, RFP: 05, NR: 05.

Convolvulaceae

1. *Ipomoea sinensis* (Des.) Choisy: Annual climber, Not common, 01, Less preferred, New Record.

*2. *Ipomoea cairica* Linn.: Perennial climber, Not found inside the study area, 05, Most Preferred, New Record.

*3. *Ipomoea carnea* Jacq.: Evergreen shrub, Common outside the study area, 02, Preferred, New Record.

*4. *Ipomoea aquatica* Forsk.: Evergreen runner, Common outside the study area, 02, Less Preferred, New Record.

5. *Ipomoea hederacea* (Jacq.): Annual climber, common, 01, Less preferred, New Record.

2. Dark Death's Head Hawkmoth

Acherontia lachesis Fabricius 1798

KFP: 25, RFP: 07, NR: 06.

Acanthaceae

1. *Barleria prionitis* Linn.: Annual herb, Common, 02, Preferred, New Record.

2. *Carvia callosa*: Annual shrub, Common, 01, Less preferred, New Record.

Boraginaceae

3. *Cordia dichotoma* Forst. f.: Deciduous tree, Not common, 01, Less preferred, New Record.

Convolvulaceae

*4. *Ipomoea carnea* Jacq.: Evergreen shrub, Common outside the study area, 01, Less Preferred, New Record.

*5. *Ipomoea aquatica* Forsk.: Evergreen runner, Common outside the study area, 01, Less Preferred, New Record.

Oleaceae

*6. *Nyctanthes arbor-tristis* Linn.: Deciduous shrub, Common outside the study area, 01, Less Preferred.

Solanaceae

7. *Solanum violaceum* Ortega: Deciduous shrub, Not common, 01, Less Preferred, New Record.

3. Dark Psilogramma

Psilogramma menepliron Cramer 1780

KFP: 14, RFP: 02, NR: 01.

Bignoniaceae

1. *Oroxylum indicum* (Linn.) Vent.: Deciduous tree, Not common, 01, Less preferred, New Record.

2. **Spathodea campanulata* Beauv.: Evergreen tree, Common outside the study area, 01, Less preferred.

4. Shorthorn Sphinx *Clanis phalaris* Cramer 1777

KFP: 08, RFP: 04, NR: 03.

Fabaceae

1. *Pueraria tuberosa* (Roxb.) DC.: Deciduous climber, Not common, 10, Most Preferred, New Record.

2. *Dalbergia lanceolaria* Linn.f.: Deciduous tree, Not common, 02, Preferred, New Record.

3. *Dalbergia latifolia* Roxb.: Deciduous tree, Not common, 02, Preferred, New Record.

4. *Pterocarpus marsupium* Roxb.: Deciduous tree, Not common, 01, Less Preferred.

5. Dentate Grey Sphinx

Polyptychus dentatus Cramer 1777

KFP: 02, RFP: 02, NR: 01.

Bombacaceae

1. *Bombax ceiba* Linn.: Deciduous tree, Common, 01, Less Preferred, New Record.

Boraginaceae

1. *Cordia dichotoma* Forst. F: Deciduous tree, Not common, 08, Most preferred.

6. Spotted Marumba *Marumba dysas* Walker 1856

KFP: 10, RFP: 5, NR: 03.

Bombacaceae

1. *Bombax ceiba* Linn.: Deciduous tree, Common, 10, Most Preferred.

Euphorbiaceae

2. *Bridelia retusa* (Linn.) Spreng.: Deciduous tree, Not common, 02, Less Preferred, New Record.

Sterculiaceae

3. *Firmiana colorata* (Roxb.) R.Br.: Deciduous tree, Not common, 50, Most Preferred, New Record.

4. *Helicteres isora* Linn.: Deciduous shrub, Very common, 10, Most Preferred.

Tiliaceae

5. *Grewia unequalis* Bl.: Deciduous tree, Common, 04, Less Preferred, New Record.

7. Brown Tip Marumba

Marumba indicus Walker 1856

KFP: 05, RFP: 01, NR: 01.

Sterculiaceae

1. *Firmiana colorata* (Roxb.) R. Br.: Deciduous tree, Not common, 25 (caterpillars reared at a time from an egg clutch), New Record.

8. Coffee Bee Hawkmoth

Cephanodes hylas hylas Linnaeus 1771

KFP: 13, RFP: 08, NR: 05.

Rubiaceae

1. *Catunaregam spinarum* (L.) Tiruveng:

Evergreen shrub, Not common, 02, Less Preferred.

2. *Gardenia lucida* Roxb.: Evergreen tree, Not common, 03, Most Preferred, New Record.

3. **Gardenia florida* Linn.: Evergreen shrub, Common outside the study area, 05, Most Preferred.

4. *Haldina cordifolia* (Roxb.) Ridsdale: Evergreen tree, Not common, 02, Less Preferred.

5. *Hymenodictyon orixense* (Roxb.) Mabb.: Evergreen tree, Not common, 03, Most Preferred, New Record.

6. *Mitragyna parvifolia* (Roxb.) Korth.: Evergreen tree, Common, 03, Most Preferred, New Record.

7. **Pavetta crassicaulis* Bremek.: Deciduous tree, Not common, 01, Less Preferred, New Record.

8. *Pavetta siphonantha* Dalz.: Deciduous tree, Not common, 01, Less Preferred.

9. Oleander Hawkmoth

Daphnis nerii Linnaeus 1758

KFP: 05, RFP: 02, NR: 01.

Apocynaceae

*1. *Alstonia scholaris* R.Br.: Evergreen tree, Not found in the study area, 01, Less preferred, New Record.

2. *Tabernaemontana coronaria* Wild.: Perennial shrub, Not found inside the study area, 06, Most Preferred.

10. Carissa Hawkmoth

Nephele hespera Fabricius 1775

KFP: 01, RFP: 01, NR: 01.

Apocynaceae

1. *Carissa congesta* Wt.: Evergreen shrub, Common, 16, New Record.

11. Turntail Hawkmoth

Neogurelca hyas Walker 1856

KFP: 03, RFP: 01, NR: 0.

Rubiaceae

1. *Morinda tinctoria* var. *tomentosa* Roxb.: Evergreen tree, Common, 05.

12. Little Hummingbird Moth

Macroglossum gyrans Walker 1856

KFP: 01, RFP: 01, NR: 0.

Rubiaceae

1. *Morinda tinctoria* var. *tomentosa* Roxb.: Evergreen tree, Common, 31.

13. Hourglass Hummingbird Moth

Macroglossum particolor Rothschild & Jordan 1903

KFP: 01, RFP: 01, NR: 0.

Rubiaceae

1. *Morinda tinctoria* var. *tomentosa* Roxb.: Evergreen tree, Common, 02.

14. Large Hummingbird Moth

Macroglossum belis Linnaeus 1758

KFP: 04, RFP: 02, NR: 02.

Rubiaceae

1. *Morinda tinctoria* var. *tomentosa* Roxb.: Evergreen tree, Common, 04, Most preferred, New Record.

2. *Spermadictyon suaveolens* Roxb.: Evergreen tree, Not found in the study area, 03, Less preferred, New Record.

15. Yellow Banded Hummingbird Moth

Macroglossum sitiene Walker 1856

KFP: 01, RFP: 01, NR: 01.

Rubiaceae

1. *Morinda tinctoria* var. *tomentosa* Roxb.: Evergreen tree, Common, 02.

16. Hogweed Hawkmoth

Hippotion boerhaviae Fabricius 1775

KFP: 06, RFP: 01, NR: 0.

Nyctaginaceae

1. *Boerhavia diffusa* Linn.: Annual herb, Not common, 01.

17. Large Yam Hawkmoth

Theretra nessus Drury 1773

KFP: 05, RFP: 01, NR: 01.

Dioscoreaceae

1. *Dioscorea hispida* Dennst.: Annual herb, Not common, 01, New Record.

18. Grapevine Black Hawkmoth

Theretra clotho clotho Drury 1773

KFP: 05, RFP: 05, NR: 05.

Araceae

1. *Amorphophallus commutatus* (Schott.) Engler: Annual herb, Common, 01, Less Preferred, New Record.

Leeaceae

2. *Leea asiatica* (Linn.) Ridsdale: Annual herb, Very common, 02, Preferred, New Record.

Vitaceae

3. *Ampelocissus latifolia* (Roxb.) Planch.: Annual climber, Very common, 05, Most preferred, New Record.

4. *Cayratia triflora* (Linn.) Domin: Annual climber, Not common, 01, Less preferred, New Record.

5. *Cissus elongata* Roxb.: Annual climber, Not common, 02, Preferred, New Record.

19. Levant Hawkmoth

Theretra alecto alecto Linnaeus 1758

KFP: 06, RFP: 02, NR: 02.

Table 3: List of Larval Food Plants

Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)	Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)
Family Saturniidae					
1. <i>Actias selene</i>	1. <i>Andromeda ovalifolia</i> 2. <i>Azadirachta indica</i> 3. <i>Betula alnoides</i> 4. <i>Carpinus bimana</i> 5. <i>Conia nepalensis</i> 6. <i>Corylus colurna</i> 7. <i>Crataegus</i> sp. 8. <i>Hibiscus</i> sp. 9. <i>Juglans regia</i> 10. <i>Lagerstroemia lanceolata</i> 11. <i>Lannea coromandelica</i> 12. <i>Lawsonia alba</i> 13. <i>Ligustrum robustum</i> 14. <i>Moringa pterygosperma</i> 15. <i>Prunus amygdalus</i> 16. <i>Prunus cerasus</i> 17. <i>Prunus domestica</i> 18. <i>Prunus padus</i> 19. <i>Prunus puddum</i> 20. <i>Pyrus communis</i> 21. <i>Pyrus malus</i> 22. <i>Rhamnus frangula</i> 23. <i>Salix babylonica</i> 24. <i>Salix elegans</i> 25. <i>Terminalia paniculata</i> 26. <i>Zanthoxylum acanthopium</i> 27. <i>Zanthoxylum alatum</i>	1. <i>Lannea coromandelica</i>		3. <i>Bombax ceiba</i> 4. <i>Bombax heptaphyllum</i> 5. <i>Canthium dicoccum</i> 6. <i>Careya arborea</i> 7. <i>Careya sphaerica</i> 8. <i>Carpinus betulus</i> 9. <i>Carissa carandas</i> 10. <i>Chloroxylon swietenia</i> 11. <i>Cipadessa fruticosa</i> 12. <i>Dalbergia</i> sp. 13. <i>Dodonaea viscosa</i> 14. <i>Eucalyptus</i> sp. 15. <i>Ficus benjamina</i> 16. <i>Ficus religiosa</i> 17. <i>Ficus retusa</i> 18. <i>Garuga pinnata</i> 19. <i>Lagerstroemia indica</i> 20. <i>Lagerstroemia parviflora</i> 21. <i>Lagerstroemia pentaptera</i> 22. <i>Pongamia pinnata</i> 23. <i>Pongamia tomentosa</i> 24. <i>Prunus domestica</i> 25. <i>Quercus</i> sp. 26. <i>Rhizophora calceolaris</i> 27. <i>Ricinus communis</i> 28. <i>Shorea robusta</i> 29. <i>Shorea talura</i> 30. <i>Syzygium cumini</i> 31. <i>Tectona grandis</i> 32. <i>Terminalia catappa</i> 33. <i>Terminalia alata</i> 34. <i>Terminalia arjuna</i> 35. <i>Terminalia bellerica</i>	
2. <i>Antheraea paphia</i>	1. <i>Bassia latifolia</i> 2. <i>Bauhinia variegata</i>	1. <i>Anogeissus latifolia</i> 2. <i>Bridelia retusa</i>			

Table 3: List of Larval Food Plants (contd.)

Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)	Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)
2. <i>Attacus atlas</i>	36. <i>Terminalia paniculata</i> 37. <i>Terminalia tomentosa</i> 38. <i>Zizyphus mauritiana</i>	1. <i>Lagerstroemia speciosa</i> * 2. <i>Lagerstroemia lanceolata</i> 3. <i>Mitragyna parvifolia</i> 4. <i>Holarrhena antidysenterica</i>	2. <i>Acherontia lachesis</i>	4. <i>Helianthus</i> sp. 5. <i>Ipomoea</i> sp. 6. <i>Phaseolus</i> sp.	4. <i>Ipomoea aquatica</i> * 5. <i>Ipomoea hederacea</i>
				1. <i>Anisomeles ovata</i> 2. <i>Anidesma</i> sp. 3. <i>Callicarpa arborea</i> 4. <i>Carapa arborea</i> 5. <i>Carapa macrophylla</i> 6. <i>Clerodendrum</i> sp.	1. <i>Barleria prionitis</i> 2. <i>Carvia callosa</i> 3. <i>Cordia dichotoma</i> 4. <i>Ipomoea carnea</i> * 5. <i>Ipomoea aquatica</i> * 6. <i>Nyctanthes arbor-tristis</i> *
				7. <i>Colebrookia oppositifolia</i> 8. <i>Coleus</i> sp. 9. <i>Datura</i> sp. 10. <i>Erythrina lithosperma</i> 11. <i>Erythrina variegata</i> 12. <i>Ipomoea</i> sp. 13. <i>Jasminum arborescens</i> 14. <i>Labiab purpurens</i> 15. <i>Lantana camara</i> 16. <i>Mussaenda frondosa</i> 17. <i>Nicotiana tabacum</i> 18. <i>Nyctanthes arbor-tristis</i> * 19. <i>Solanum</i> sp.	7. <i>Solanum violaceum</i>
				20. <i>Spathodea campanulata</i> 21. <i>Stachytarpheta indica</i> 22. <i>Stereospermum</i> sp. 23. <i>Tectona grandiflora</i> 24. <i>Tectona grandis</i> 25. <i>Vitex negundo</i>	
Family Sphingidae			3. <i>Psilogramma menephron</i>	1. <i>Aporosa villosa</i> 2. <i>Callicarpa arborea</i>	1. <i>Oroxylum indicum</i> 2. <i>Spathodea campanulata</i> *
1. <i>Agrius convolvuli</i>	1. <i>Arachis hypogea</i> 2. <i>Convolvulus</i> spp. 3. <i>Dolichos lablab</i>	1. <i>Ipomoea sinensis</i> 2. <i>Ipomoea cairica</i> * 3. <i>Ipomoea carnea</i> *			

Table 3: List of Larval Food Plants (contd.)

Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)	Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)
	3. <i>Clerodendrum infortunatum</i> 4. <i>Gmelina arborea</i> 5. <i>Heterophragma adenophyllum</i> 6. <i>Jasminum arborescens</i> 7. <i>Ligustrum robustum</i> 8. <i>Meliosma fordii</i> 9. <i>Nyctanthes arbor-tristis</i> 10. <i>Olea vaticum</i> 11. <i>Spathodea campanulata</i> * 12. <i>Stereospermum chelenoides</i> 13. <i>Tectona grandis</i> 14. <i>Vitex negundo</i>			3. <i>Cordia rothi</i> 4. <i>Ehretia laevis</i> 5. <i>Grewia microcos</i> 6. <i>Helicteres isora</i> 7. <i>Kydia calycina</i> 8. <i>Sapindus trifoliatus</i> 9. <i>Schleichera trijuga</i> 10. <i>Sterculia villosa</i>	3. <i>Firmiana colorata</i> 4. <i>Grewia inequalis</i> 5. <i>Helicteres isora</i>
			7. <i>Marumba indicus</i>	1. <i>Bombax ceiba</i> 2. <i>Grewia inequalis</i> 3. <i>Helicteres isora</i> 4. <i>Sterculia urens</i> 5. <i>Sterculia villosa</i>	1. <i>Firmiana colorata</i>
			8. <i>Cephanodes hylas</i>	1. <i>Catunaregam spinarum</i> 2. <i>Coffea benghalensis</i> 3. <i>Gardenia florida</i> * 4. <i>Haldina cordifolia</i> 5. <i>Hymenodictyon obovatum</i> 6. <i>Hymenodictyon excelsum</i> 7. <i>Ixora brachiata</i> 8. <i>Pavetta indica</i> 9. <i>Stephegyne diversifolia</i> 10. <i>Stephegyne parvifolia</i> 11. <i>Tectona grandis</i> 12. <i>Wendlandia</i> spp. 13. <i>Xylia xylocarpa</i>	1. <i>Catunaregam spinarum</i> 2. <i>Gardenia florida</i> * 3. <i>Gardenia lucida</i> 4. <i>Haldina cordifolia</i> 5. <i>Hymenodictyon orixense</i> 6. <i>Mitragyna parvifolia</i> 7. <i>Pavetta siphonantha</i> 8. <i>Pavetta crassicaulis</i> *
4. <i>Clanis phalaris</i>	1. <i>Butea monosperma</i> 2. <i>Cassia fistula</i> 3. <i>Dalbergia volubilis</i> 4. <i>Milletia atropurpurea</i> 5. <i>Mucuna pruriens</i> 6. <i>Pongamia pinnata</i> 7. <i>Pterocarpus marsupium</i> 8. <i>Xylia xylocarpa</i>	1. <i>Dalbergia lanceolaria</i> 2. <i>Dalbergia latifolia</i> 3. <i>Pterocarpus marsupium</i> 4. <i>Pueraria tuberosa</i>			
5. <i>Polyptychus dentatus</i>	1. <i>Cordia dichotoma</i> 2. <i>Ehretia</i> sp.	1. <i>Bombax ceiba</i> 2. <i>Cordia dichotoma</i>			
6. <i>Marumba dyras</i>	1. <i>Bombax ceiba</i> 2. <i>Bridelia</i> sp.	1. <i>Bombax ceiba</i> 2. <i>Bridelia retusa</i>			

Table 3: List of Larval Food Plants (contd.)

Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)	Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)
9. <i>Daphnis nerii</i>	1. <i>Ervatamia altemifolia</i> 2. <i>Holarrhena antidyssenterica</i> 3. <i>Nerium odorum</i> 4. <i>Tabernaemontana coronaria</i> 5. <i>Vinca sp.</i>	1. <i>Alstonia scholaris</i> 2. <i>Tabernaemontana coronaria</i> *		4. <i>Boerhavia diffusa</i> 5. <i>Boerhavia repens</i> 6. <i>Glossostigma spathulatum</i>	
10. <i>Nephele hespera</i>	1. <i>Carissa carandas</i>	1. <i>Carissa congesta</i>	17. <i>Thereira nessus</i>	1. <i>Amorphophallus sp.</i> 2. <i>Barringtonia sp.</i> 3. <i>Convolvulus sp.</i> 4. <i>Dioscorea sp.</i> 5. <i>Pongamia pinnata</i>	1. <i>Dioscorea hispida</i>
11. <i>Neogurelca hyas</i>	1. <i>Morinda citrifolia</i> 2. <i>Morinda tinctoria</i> 3. <i>Paedonia foetida</i>	1. <i>Morinda tinctoria</i> var. <i>tomentosa</i>	18. <i>Thereira clotho</i>	1. <i>Amorphophallus sp.</i> 2. <i>Begonia sp.</i> 3. <i>Dillenia sp.</i> 4. <i>Fuchsia sp.</i> 5. <i>Vitis sp.</i>	1. <i>Amorphophallus commutatus</i> 2. <i>Ampelocissus latifolia</i> 3. <i>Cayratia triflora</i> 4. <i>Cissus elongata</i> 5. <i>Leea asiatica</i>
12. <i>Macroglossum gyrans</i>	1. <i>Morinda tinctoria</i>	1. <i>Morinda tinctoria</i> var. <i>tomentosa</i>			
13. <i>Macroglossum particular</i>	1. <i>Morinda citrifolia</i>	1. <i>Morinda tinctoria</i> var. <i>tomentosa</i>	19. <i>Thereira alecto</i>	1. <i>Dillenia indica</i> 2. <i>Leea sp.</i> 3. <i>Psychotria sp.</i> 4. <i>Rubia cordifolia</i> 5. <i>Shorea robusta</i> 6. <i>Vitis trifolia</i>	1. <i>Ampelocissus latifolia</i> 2. <i>Morinda tinctoria</i> var. <i>tomentosa</i>
14. <i>Macroglossum belis</i>	1. <i>Hamiltonia suaveolens</i> 2. <i>Morinda sp.</i> 3. <i>Saprosma indicum</i> 4. <i>Strychnos nux-vomica</i>	1. <i>Morinda tinctoria</i> var. <i>tomentosa</i> 2. <i>Spermadictyon suaveolens</i>			
15. <i>Macroglossum sitiene</i>	1. <i>Morinda umbellata</i>	1. <i>Morinda tinctoria</i> var. <i>tomentosa</i>	20. <i>Thereira lycetus</i>	1. <i>Arum sp.</i> 2. <i>Dillenia pentagyna</i> 3. <i>Leea sambucina</i> 4. <i>Vitis sp.</i>	1. <i>Leea asiatica</i> 2. <i>Leea macrophylla</i>
16. <i>Hippotion boerhavia</i>	1. <i>Impatiens spp.</i> 2. <i>Spermacoce hispida</i> 3. <i>Spermacoce stricta</i>	1. <i>Boerhavia diffusa</i>	21. <i>Thereira oldenlandiae</i>	1. <i>Arisaema sp.</i>	1. <i>Ampelocissus latifolia</i>

Table 3: List of Larval Food Plants (contd.)

Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)	Moth Species	Known Food Plants (Food plants known from the study area are given in bold type)	Food Plants Recorded (new records are given in bold type)
	2. <i>Caryea arborea</i> 3. <i>Caladium bicolor</i> 4. <i>Colocasia fallax</i> 5. <i>Corchorus capsularis</i> 6. <i>Cryptocoryne</i> sp. 7. <i>Impatiens</i> sp. 8. <i>Ipomoea batatas</i> 9. <i>Jussiaea suffruticosa</i> 10. <i>Oldenlandia corymbosa</i> 11. <i>Vitis</i> sp.	2. <i>Impatiens balsamina</i>		2. <i>Arisaema</i> sp. 3. <i>Knoxia mollis</i> 4. <i>Impatiens cuspidata</i>	2. <i>Arisaema murrayi</i> *
22. <i>Thereita castanea</i>	1. <i>Arriopsis peltata</i>	1. <i>Amorphophallus commutatus</i>	23. <i>Pergesa acteus</i>	1. <i>Amorphophallus</i> sp. 2. <i>Arisaema</i> sp. 3. <i>Begonia</i> sp. 4. <i>Caladium bicolor</i> 5. <i>Colocasia</i> sp. 6. <i>Commelina bengalensis</i> 7. <i>Vitis</i> sp.	1. <i>Amorphophallus commutatus</i> 2. <i>Leea asiatica</i>

* : Recorded outside study area

Rubiaceae

1. *Morinda tinctoria* var. *tomentosa* Roxb.: Evergreen tree, Common, 02, preferred, New Record.

Vitaceae

2. *Ampelocissus latifolia* (Roxb.) Planch.: Annual climber, Very common, 02, New Record.

20. Golden Striped Sphinx

Theretra lyctus Cramer 1775

KFP: 04, RFP: 02, NR: 02.

Leeaceae

1. *Leea asiatica* (Linn.) Ridsdale: Annual herb, Very common, 14, Most Preferred, New Record.
2. *Leea macrophylla* Roxb. ex Hornem: Annual herb, Not common, 04, Preferred, New Record.

21. Silver Striped Hawkmoth

Theretra oldenlandiae Fabricius 1775

KFP: 11, RFP: 02, NR: 02.

Balsaminaceae

1. *Impatiens balsamina* Linn.: Annual herb, Common, 01, Less Preferred, New Record.

Vitaceae

2. *Ampelocissus latifolia* (Roxb.) Planch.: Annual climber, Very common, 02, Preferred, New Record.

22. Copper Hawkmoth

Theretra castanea Moore 1872

KFP: 04, RFP: 02, NR: 02.

Araceae

1. *Arisaema murrayi* Hook: Annual herb, Not found in the study area, 16, Most preferred, New Record.
2. *Amorphophallus commutatus* (Schott.) Engler: Annual herb, Common, 01, Preferred, New Record.

23. Little Yam Hawkmoth

Pergesa acteus Cramer 1779

KFP: 07, RFP: 02, NR: 02

Araceae

1. *Amorphophallus commutatus* (Schott.) Engler: Annual herb, Common, 04, Most preferred, New Record.

Leeaceae

2. *Leea asiatica* (Linn.) Ridsdale: Annual herb, Very common, 01, Less Preferred, New Record.

The larval food plants were recorded from the study area as well as from other areas (Table 3). For Family Saturniidae, of the 80 known food plants, 17 are found in the study area, of which we recorded only 5 along with 10 new larval food plants. For Family Sphingidae, of the 111 known food plants, 49 are found in the study area, of which we recorded 11 along with 33 new larval food plants. The ratio of known to new

food plants for each family is 80:10 for Saturnids and 111:33 for Sphingids.

ABUNDANCE OF LARVAL FOOD PLANTS

As the study area has predominantly deciduous vegetation, analysis was carried out in order to assess the food availability in different seasons. The vegetation analysis of the recorded larval food plants was conducted in two seasons, Monsoon (July) and Non-Monsoon (March) so that both seasonal and perennial food plants were covered.

The monsoon survey showed that most of the food plants were seasonal climbers and shrubs. *Leea asiatica*, *L. macrophylla*, *Amorphophallus commutatus*, *Ampelocissus latifolia* and *Pueraria tuberosa* were available during the monsoon in the study area. These perennial plants had very short life cycles that synchronized with the end of the monsoon. The abundance of the seasonal plants exceeded that of the perennial food plants in the study area. All the recorded larval food plants could not be covered in the vegetation analysis, as they did not fall within the range of the quadrats laid out. Altogether, 22 larval food plants were recorded, of which 6 were deciduous, 10 were evergreen and 6 were seasonal. As per Fig. 3, it was observed that during monsoon, the herb *Leea asiatica* was most abundant, followed by a shrub *Helicteres isora*, climber *Ampelocissus latifolia* and herb *Amorphophallus commutatus*. Except *Helicteres isora*, the others were seasonal plants. Eleven larval food plants, which were poorly represented in the survey, were listed as 'Others' in Fig. 3. These included *Hymenodictyon orixense*, *Terminalia crenulata*, *Haldina cordifolia*, *Leea macrophylla*, *Pueraria tuberosa*, *Pavetta siphonantha*, *Zizyphus mauritiana*, *Mitragyna parvifolia*, *Gardenia lucida*, *Cordia dichotoma* and *Zizyphus rugosa*.

The survey of food plants in the non-monsoon season showed low diversity. It was observed that most of the food plants recorded were evergreen with mature leaves, except *Morinda tinctoria* var. *tomentosa* and *Carissa congesta* that had tender leaves, which was foraged by the caterpillars. The survey documented 6 species of larval food plants (see Fig. 4), which were solely foraged by Sphingids. These were all evergreen trees, except for the shrub *Helicteres isora*, which was deciduous. Of the 6 species, 3 were dominant, contributing 95% of the total larval food plants. The most dominant was *Helicteres isora*, followed by the evergreen *Carissa congesta* and *Morinda tinctoria*. The other evergreen plants, *Hymenodictyon orixense*, and *Haldina cordifolia* and *Gardenia lucida* among 'Others' in Fig. 4 constituted the remainder.

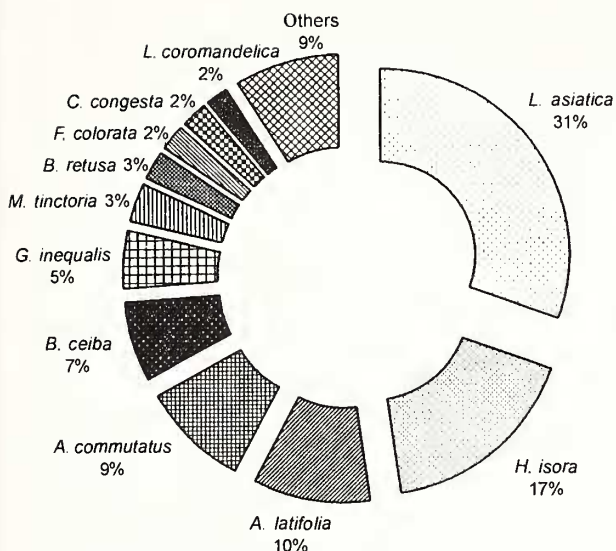


Fig. 3: Abundance of Larval Food Plants (Wet Season)

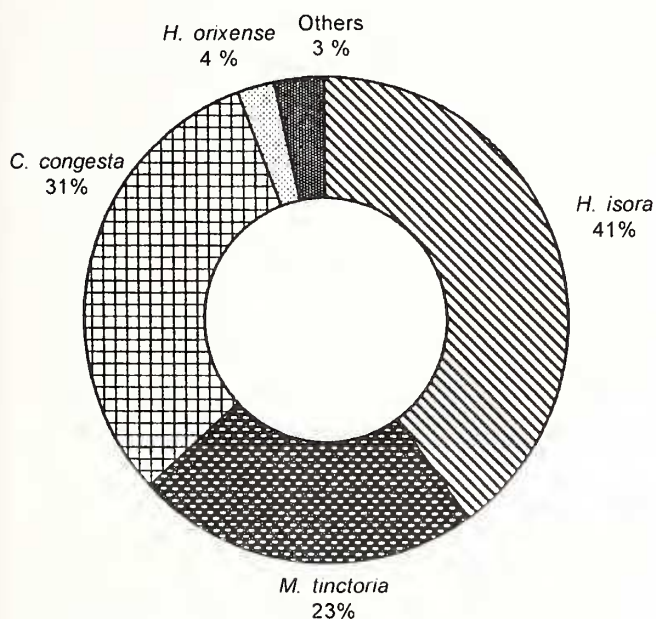


Fig. 4: Abundance of Larval Food Plants (Dry Season)

DISCUSSION

Seasonal occurrence of larval food plants was found to determine the moth species feeding on the plants. Since Sphingids feed on seasonal as well as perennial plants, they were found throughout the year, while Saturniids, which mainly feed on deciduous trees in the larval stage suffered a setback. Family Sphingidae utilizes a variety of larval food plants, ranging from climbers to trees, whereas Saturniidae exclusively preferred trees. The variation observed for Sphingidae was not only in the diversity, but also in the abundance of food plants.

The study supports the views of Speight and Wain House (1989), who stated that food plants that are abundant and widely distributed are host to more insect species than those with restricted distribution. For Sphingidae, the plant family Rubiaceae, which supports maximum moth species i.e. 8., being common and perennial, was available throughout the year, especially for *Macroglossum gyrans*, which was also found round the year.

The finding also reflected the views of Jermy (1984), who stated that insect diversity could be broadly predicted from the abundance of a particular plant species. This association clearly proves that insects and plants have co-evolved. In the study area, 33 new larval food plants supported 20 species of Sphingid Hawkmoths, showing clearly the relation between moth diversity and abundance of the food plants. With the new and present records the number of larval food plants for Family Saturniidae has increased from 80 to 90 and for Family Sphingidae from 111 to 144.

The study also supports Scott (1933) who theorised that the selection of certain food plants by moths appears to be not very reliable. Though the occurrence of moth species is solely dependent on the availability of food plants, the range of any species of hawkmoth (e.g. *Marumba dyras*) is by no means coincidental with that of its food plants, while some common species (e.g. *Macroglossum belis*) may be found where their food plants are available, others (e.g. *Pergesa acteus*) are found only in very restricted areas, though their food plant covers a wide range. One species was common (e.g. *Theretra clotho*) and widespread; while another closely allied (e.g. *Theretra alecto*) species feeding on the same plant was rare and restricted.

In generalist moth species, it was observed that while a few species were selective about their larval food plants, some showed 'acting specialist' behaviour. In Family Saturniidae, *Actias selene* was the acting specialist because it preferred *Lankea coromandelica* over *Lagerstroemia lanceolata*, a known food plant from the study area, while *Nephele hespera* from Family Sphingidae known to prefer *Carissa carandas*, which was restricted to the southern part of the country, preferred *Carissa congesta*, an allied plant species in the study area. In generalist species, moths preferred new larval food plants over the known e.g. *Marumba indicus*, which had 4 known larval food plants from the study area, preferred a new larval food plant. Also, *Theretra clotho* ignored its only known larval food plant for 5 new larval food plants, while *Neogurelca hyas* preferred one to its 3 known larval food plants. Since the known larval food plants were compiled from different parts of the country, it could be concluded that

geographical location and climatic variation possibly influences larval food plant selection of Saturniids and Sphingids.

Lastly as per Scott (1933), the specialist and acting specialist species, such as *Nephele hespera* and

Macroglossum gyrans, would be treated as indicator species, which exclusively preferred single plant species i.e. *Carissa congesta* and *Morinda tinctoria* var. *tomentosa* and could be used in habitat monitoring programmes of the study area.

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